

SECTION 347
PORTLAND CEMENT CONCRETE - CLASS I
(NONSTRUCTURAL)

347-1 Description.

The requirements of this Section are applicable to concrete designated as Class I (Nonstructural), hereinafter referred to as concrete. Use concrete composed of a mixture of portland cement, aggregates and water, with or without admixtures, slag, or pozzolanic materials. Deliver the concrete to the site of placement in a freshly mixed, unhardened state.

347-2 Materials.

347-2.1 General: Certify that all materials used in concrete are from Department approved sources, and free from frozen or other detrimental matter.

Meet the following requirements:

- (a) Portland Cement Section 921
- (b) Fine Aggregate Section 902
- (c) Coarse Aggregate Section 901
- (d) Water Section 923
- (e) Admixtures Section 924
- (f) Slag, Fly Ash and other Pozzolanic Materials Section 929

347-2.2 Admixture Requirements: Chemical admixtures may be added at the Contractor's option at the dosage rates recommended by the manufacturer.

347-2.3 Substitution or Adjustment of Materials: Any approved component material in the design mix may be substituted or adjusted, using a material from an approved source. If unsatisfactory results are obtained with the different material, return to the originally approved material source for supply. Notify the Engineer prior to the substitution.

347-2.4 Material Storage:

347-2.4.1 Cementitious Material Storage: At each concrete production facility, as a minimum, provide a separate and clearly labeled weatherproof facility to store each brand or type of cementitious material without mixing or contamination. Provide a suitable, safe and convenient means of collecting cementitious material samples at each storage facility.

347-2.4.2 Aggregate Storage: At each concrete production facility, as a minimum, provide suitable bins, stockpiles or silos to store and identify aggregates without mixing, segregating or contaminating the different materials in regard to grade or source. Identify Department approved pit number and aggregate type/gradation. Handle the aggregates in a manner to minimize segregation and to recover material from storage for use in the mix in a manner that it will be within Specification limits. Continuously and uniformly sprinkle coarse aggregate with fresh water for 24 hours preceding introduction into the concrete mix. Maintain stored aggregates in a well drained condition to minimize free water content. Provide access for the Engineer to sample the aggregates from the recovery side of the storage facility.

347-3 Production, Mixing and Delivery.

347-3.1 Concrete Production Requirements: Produce concrete utilizing equipment which is in good operating condition and operated in a manner to ensure a consistent product meeting the requirements of the specifications. Within two hours prior to each day's batching, determine the free moisture for the coarse and fine aggregates. On concrete placements expected to exceed three hours, perform an additional moisture test approximately half way through the batching operations. Adjust batch proportions accordingly. At least quarterly, check all scales, meters and other weighing or measuring

devices, excluding admixture dispensers, for accuracy by a qualified representative of a scale company registered with the Bureau of Weights and Measures of the Florida Department of Agriculture prior to production of concrete. Minor adjustments to previously approved mix designs may be made without a new mix design request. Show batch adjustments on the concrete delivery tickets.

347-3.2 Mixers: Use mixers capable of combining the components of concrete into a thoroughly mixed and uniform mass, free from balls or lumps of cementitious material, and capable of discharging the concrete uniformly. Operate concrete mixers at speeds per the manufacturer's design or recommendation. Do not exceed the manufacturer's rated capacity for the volume of mixed concrete in the mixer, mixing drum or container.

347-3.3 Delivery: Do not exceed 120 minutes elapsed time between the initial addition of water to the mix and depositing the concrete at the point of final placement, subject to the ability to place and consolidate the concrete in accordance with specification requirements. Make adjustments to mix consistency at the site of placement only before any concrete from the load is placed. Do not make adjustments which will cause the allowable slump or maximum specified water cementitious ratio to be exceeded.

347-4 Control of Quality.

347-4.1 Concrete Mix Design: Prior to production of any concrete, submit a proposed mix design to the Engineer on the "Concrete Mix Design" form attached to the Contract Documents. Use only concrete mix designs having prior approval of the Engineer. The 28-day minimum compressive strength of concrete is 2,500 psi [17 MPa]. The minimum cementitious content of concrete is 470 lb/yd³ [280 kg/m³]. The maximum water cementitious ratio for concrete is 0.55 lb/lb [0.55 kg/kg]. The slump range is between 0 and 6 inches [0 and 150 mm]. Meet the theoretical yield requirements of the approved mix design on adjusted mixes. Note batch substitutions or adjustments on the "Concrete Mix Design" and "Delivery Ticket / Certification" forms. The Department may disqualify any concrete production facility for non-compliance with Specification requirements. The Department may disapprove any mix design which exhibits unacceptable strength or field performance.

347-4.2 Sampling and Testing: Assume responsibility for Quality Control sampling and testing of concrete. Use sampling methods approved by the Engineer. Test at least one representative sample of concrete from each day's production of each design mix from each production facility. Make a slump test and cast four cylinders, each 6 by 12 inches [150 mm by 300 mm], from each sample. Test two cylinders for compressive strength seven days after casting, and the other two cylinders 28 days after casting. A strength test result will be the average of the compressive strengths of two cylinders cast from the same sample and tested on the same day. Maintain a running average of the latest three consecutive 28-day strength test results. If the average falls below 2,800 psi [19 MPa], test two representative samples of concrete from each day's production of that design mix from each production facility as described above, until the average is above 2,800 psi [19 MPa]. Perform all sampling, curing and testing in accordance with Florida Methods (FM). Use personnel certified as ACI Field Testing Technician Grade I to perform all sampling and testing of plastic concrete. Use CCRL or CMEC inspected laboratories to perform all laboratory testing, including compressive strength testing of hardened concrete, with all deficiencies corrected. The Engineer may sample the concrete at the production facility or at the point of placement to verify the results of the Contractor's Quality Control tests. Make the samples of plastic concrete available as determined necessary by the Engineer for testing. Document, certify and submit failing hardened concrete Quality Control test results on a form acceptable to the Engineer upon completion of the individual tests.

347-4.3 Records: Keep all records available for review by the Engineer. Keep the following records at each concrete production facility:

1. Approved concrete mix designs.
2. Materials source / Specification compliance (delivery tickets, certifications, certified mill test reports).

3. A copy of the scale company or testing agency report showing the observed deviations from quantities checked during calibration of the scales and meters. Certification document for the admixture weighing / measuring devices. Calibrate all measuring devices in accordance with Chapter 531, Florida Statutes, at the discretion of the Engineer.

4. Plastic and hardened concrete Quality Control test results.

5. Certifications of Testing Technicians and Testing Laboratories.

347-5 Certification and Acceptance.

Furnish Delivery Certification with each batch of concrete before unloading at the site of placement. Provide Delivery Certification on a delivery ticket on which is printed, stamped or written the information required on the Delivery Ticket/Certification attached to the Contract Documents. Record the actual material quantities incorporated into the mix on the ticket. Have the delivery ticket signed by the Batchers responsible for production of the concrete, certifying that the batch was produced in accordance with specification requirements, and that the running average of 28-day strength test results for that design mix indicate that the concrete delivered for placement should meet minimum 28-day compressive strength requirements. Also, have the Contractor's representative responsible for handling and placing the concrete sign the delivery ticket certifying that the maximum specified water cement ratio was not exceeded due to any jobsite adjustments to the batch, and that the batch was handled and placed in accordance with specification requirements. Concrete acceptance by the Department will be by Certification to the Department on the delivery ticket, as described herein, by the Batchers and the Contractor, for each batch of concrete produced and incorporated into the work. If concrete produced, supplied, placed and tested in accordance with specification requirements fails to prove satisfactory and adequate to perform its intended purpose, as determined by the Engineer, remove and replace the concrete at no expense to the Department.